

Chapter 11

**ENVIRONMENTAL MONITORING
AND REQUIREMENTS**

11. ENVIRONMENTAL MONITORING AND AUDIT REQUIREMENTS

Introduction

- 11.1 This section briefly describes the environmental monitoring and audit (EM&A) requirements during various phases of the decommissioning Project, based on the assessment results of various environmental issues.
- 11.2 The objectives of carrying out EM&A for the Project include the following:
- to provide a database against which any short or long term environmental impacts of the Project can be determined;
 - to provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards;
 - to monitor the performance of the Project and the effectiveness of mitigation measures;
 - to verify the environmental impacts predicted in this EIA;
 - to determine project compliance with regulatory requirements, standards and government policies;
 - to take remedial action if unexpected problems or unacceptable impacts arise; and
 - to provide data to enable an environmental audit.
- 11.3 The following sections summarise the recommended EM&A requirements. Details of EM&A are provided in a stand-alone EM&A Manual.

Land Contamination

- 11.4 As presented in the chapter "Land Contamination Assessment", the remedial proposal to excavate contaminated soil and treat the soil on site (for metal-contaminated soil) and off site (for other types of contaminated soil) has been recommended. The contaminated soil will be separated from the soil system, hence no monitoring for soil and groundwater is required. The progress monitoring of soil treatment is in effect to gauge the effectiveness of the remedial systems and is of a purpose other than environmental impacts and would not be included in the scope of EM&A.
- 11.5 EM&A requirements for the secondary impacts, such as of air and water quality, arising from the remediation work would be addressed in the relevant sections of this chapter.
- 11.6 Whenever the dewatering is needed during excavation, the groundwater shall be recharged within 10m of the extraction point and below the water table. Regular monitoring of groundwater level at the recharge point and the proximate locations is recommended to ensure insignificant migration of contaminant in groundwater or soils due to the locally risen groundwater level.
- 11.7 TPH free product was encountered during the site investigation in one monitoring well in Building D (located at Area 1 of the CLS site). It is recommended that any free product encountered during excavation at Building D (or other areas of the CLS site) shall be skimmed, containerised and collected by a licensed chemical waste collector for final

disposal. In this regard, it is also recommended that monitoring and confirmation sampling/testing be carried out to ensure complete removal of any free product encountered during excavation.

- 11.8 In addition, it is recommended that confirmation sampling/testing shall be carried out for: (i) soil excavation (to ensure complete excavation of contaminated soil); (ii) biopile treatment (to ensure attainment of cleanup targets); (iii) solidification (to ensure attainment of cleanup targets); and (iv) thermal desorption process (to ensure attainment of cleanup target).

Air Quality

Building Demolition and Slope Improvement Phases

- 11.9 According to the assessment result, air quality impact due to fugitive dust emissions during demolition and slope works is not significant with the implementation of dust reduction measures as stipulated in the *Air Pollution Control (Construction Dust) Regulation* implemented. Dust monitoring during the building demolition and slope improvement phases is considered not necessary but weekly site audits are required to ensure the efficacy of the dust reduction measure.

Remediation Phase

At Cheoy Lee Site

- 11.10 It has been recommended in the land contamination assessment that soils in some areas of CLS due to their contamination will be excavated for off-site treatment. Assessment of the associated air quality impact has been made and dioxins would be emitted, in form of dust, during excavation process. It is therefore recommended that the excavation rate shall be kept to a minimum as much as practicable to avoid excessive re-entrainment of dioxins into ambient air. To warrant compliance with the relevant standards, dust and dioxin levels shall be monitored during the excavation for the adjacent air sensitive receiver, i.e. the CLP gas turbine power station.
- 11.11 Solidification will be conducted in CLS for stabilisation of heavy metal in soil. Air quality impact is expected to be low with the solidification plant. Air monitoring during soil treatment at CLS is considered not necessary.

At To Kau Wan Site

- 11.12 To Kau Wan will be selected of where the CLS contaminated soils are to be treated by biopiling, thermal desorption and solidification. Potential dust quality impacts will arise from unloading of general contaminated materials and truck haulage. Vent gas emissions of TOCs as biodegradation products from biopiling, TOC and dioxin emissions from the thermal desorption facility are expected. Stack monitoring of thermal desorption facilities is therefore recommended to ensure no excessive emissions of TOCs and dioxin that will adversely impact the nearby air sensitive receivers.

- 11.13 Ambient air quality monitoring for dust and dioxin at the adjacent air sensitive receivers is recommended for possible duct emissions from the biopile formation and stack emission from the thermal desorption plant.
- 11.14 Site audits are also recommended to ensure the effective implementation of site dust reduction measures.

To Kau Wan Decommissioning

- 11.15 Air quality impact due to fugitive dust emissions during TKW decommissioning is not significant with the implementation of dust reduction measures as stipulated in the *Air Pollution Control (Construction Dust) Regulation* implemented. Dust monitoring is considered not necessary but weekly site audits are required to ensure the efficacy of the dust reduction measure.

Waste Management

- 11.16 Waste management will be the contractor's responsibility to ensure that all wastes produced during the Project are handled, stored and disposed of in accordance with EPD's good waste management practices, and regulations and requirements. The mitigation measures recommended in the Chapter "Waste Management Implications" of the EIA Report including special procedures in handling chemical wastes and asbestos during disposal and transportation, good site management and reuse and recycling of construction and demolition material, shall form the basis of the site Waste Management Plan to be developed by the Contractor for the Project.
- 11.17 It is recommended that the waste arising generated during Project shall be audited periodically to determine if wastes are being managed in accordance with approved procedures and the site Waste Management Plan. Site audits on weekly basis throughout all Project phases shall look at all aspects of waste management including waste generation, storage, recycling, transport and disposal.

Water Quality

Building Demolition and Slope Improvement Phases

- 11.18 No adverse impact is expected during the demolition/ excavation phases given that no contaminated water will be discharged into the local drainage and good practices stipulated in EPD's *ProPECC Note PN 1/94 "Construction Site Drainage"* have been implemented. Furthermore, weekly site audits are required to ensure compliance with mitigation measures and environmental quality performance limits.

Remediation Phase

At Cheoy Lee Site

- 11.19 There will be a small-scale free product recovery system (with recharge within the same building) and, therefore, no water quality impact is expected. Marine water quality monitoring during remediation phase is considered not necessary for the CLS site and sensitive receivers in vicinity. Weekly site audits are considered necessary to ensure implementation of good site practices for not causing adverse water quality impacts.
- 11.20 The monitoring requirement for the groundwater recharge during dewatering has been given in the land contamination section of this chapter.
- 11.21 Quality of the effluent from the water treatment unit before discharged shall be monitored in accordance with the licensing requirement under the *Water Pollution Control Ordinance* and checked compliance with the *Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters*.

At To Kau Wan Site

- 11.22 In the chapter "Land Contamination" of this EIA Report, some mitigation measures, such as low permeability floor liners and cover for the biopiles are recommended to control the contaminated runoff such that the associated water quality impact is not expected and therefore monitoring is considered not necessary. Weekly site audit is, however, required to ensure implementation of the mitigation measures and good site practices as given in the EPD's ProPECC Note PN 1/94.
- 11.23 Effluents from the water treatment unit for all plants leachate and surface runoff collected at the thermal desorption plant shall be monitored in accordance with the licensing requirement under the *Water Pollution Control Ordinance* and checked compliance with the *Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters*.

To Kau Wan Decommissioning

- 11.24 No adverse impact is expected during TKW decommissioning given that good practices stipulated in EPD's *ProPECC Note PN 1/94 "Construction Site Drainage"* have been implemented. Furthermore, weekly site audits are required to ensure compliance with mitigation measures and environmental quality performance limits

Ecology

- 11.25 The ecological assessment in this report has revealed some restricted/protected plant species and the habitat of a rare fish species (*Oryzias curvinotus*) in Mong Tung Hang Stream will be impacted by the Project and mitigation measures have been recommended. The mitigation

measure includes transplantation, seed collection, plant storage and cutting collection/cultivation for the restricted/protected plants; and habitat recreation for the fish species in the Mong Tung Hang Stream.

Monitoring and Maintenance of transplanted plants

11.26 To maximise success rate of relocation, the plants and their environment need to be carefully monitored after transplantation. The monitoring work shall include:

- Checking of the species composition, percentage coverage and condition of vegetation on each of the tagged areas of transplanted wetland and *N.mirabilis* plants;
- Recording of the condition of the wetland/plants in terms of the presence of flowers/seeds, leaf colour, signs of disease/pests, signs of stress (e.g., resulting from lack of water/too much sunlight); and evidence of self regeneration;
- Determining the abiotic factors including water quality parameters (water depth, dissolved oxygen, pH, salinity, temperature) and soil conditions; and
- Recording of any signs of plant stress together with actions taken.

11.27 During monitoring, routine maintenance of the receptor site to ensure sufficient water receiving of the wetlands/ plants and to control invasive plant species such as exotic climber from smothering the transplanted species shall be implemented.

Short reports containing results of field investigation and measurements should be prepared after each monthly survey. Submitted by the contractors monitoring team for review by the IEC and EPD within 15 days of the end of the reporting month. Reports should contain details of:

- Monitoring work undertaken during the reporting period;
- Plant survival;
- Signs of plant stress; and
- Any management actions undertaken.

Monitoring of the Relocated Fish Species

11.28 It is important that *O.curvinotus* are moved to the recreated habitat following the completion of slope/fill works, and the construction of the channelised section of MTHS. Additionally, surveys of fauna (e.g., macroinvertebrates) in the recreated habitat should be conducted before the fish are re-located. The Rice-fish should only be relocated after the habitat has become established, and has been colonised by aquatic invertebrates and other organisms.

- 11.29 After relocation, the *O. curvinitus* population should be regularly monitored to verify the success of the habitat recreation.

Summary

- 11.30 A summary for all parameters to be monitored and audited during construction phase and operational phases are summarised in Table 11.1.

Table 11.1 Summary of EM&A Requirements

Parameter	Building Demolition and Slope Improvement Phases	Monitoring and Audit Requirements		
		Remediation Phase	At TKW	TKW Decommissioning Phase
Land Contamination	Nil	<ul style="list-style-type: none"> Monitoring of groundwater level at recharge point and the proximate location during dewatering. Monitoring and confirmation sampling/testing shall be carried out to ensure complete removal of any free product encountered during excavation. Confirmation sampling/testing shall be carried out for: (i) soil excavation; (ii) biopile treatment; (iii) solidification; and (iv) thermal desorption process. 	<ul style="list-style-type: none"> Weekly site audits 	<ul style="list-style-type: none"> Weekly site audits
Air Quality	<ul style="list-style-type: none"> Weekly site audits 	<ul style="list-style-type: none"> Ambient TSP and dioxin monitoring at sensitive receivers. 	<ul style="list-style-type: none"> Ambient TSP and dioxin monitoring at sensitive receivers. Monitoring of TOC in biopile gas effluent Stack monitoring of dioxin emission from the thermal desorption plant CEM of TOC, O₂, CO₂ and CO from the stack of thermal desorption plant Weekly site audits 	<ul style="list-style-type: none"> Weekly site audits
Waste Management	<ul style="list-style-type: none"> Weekly site audits 	<ul style="list-style-type: none"> Weekly site audits 	<ul style="list-style-type: none"> Weekly site audits 	<ul style="list-style-type: none"> Weekly site audits
Water Quality	<ul style="list-style-type: none"> Weekly site audits 	<ul style="list-style-type: none"> Monitoring of the effluent quality of the water treatment 	<ul style="list-style-type: none"> Monitoring of the effluent quality of the water treatment 	<ul style="list-style-type: none"> Weekly site audits

		unit (for wheel washing and decontamination water) <ul style="list-style-type: none"> Weekly site audits 	unit (for wheel washing water, decontamination water, leachate and runoff from thermal desorption plant) <ul style="list-style-type: none"> Weekly site audits 	
Ecology	<ul style="list-style-type: none"> Monitoring of transplanted plants at the receptor site. Monitoring of stream fauna (e.g. macroinvertebrates at the new habitat prior to the relocation of Rice fish). Monitoring of relocated fish species at the new habitat 			